1/87

Preliminary

INSTRUCTION MANUAL

ULTRASONIC TRIM KNIFE

IMPORTANT SERVICE LITERATURE
Forward to your Service Department.

BRANSON ULTRASONICS CORPORATION
Eagle Rd., Danbury, CT 06810-1961 (203) 796-0400

MANUAL CHANGE INFORMATION

At Branson, we strive to maintain our postion as the leader in ultrasonic, plastic joining technology by continually improving circuits and components in our equipment. These improvements are incorporated as soon as they are developed and thoroughly tested.

Information concerning any improvements will be added to the appropriate manual section(s) at the next printing. Therefore, reference should be made to the printing date which appears in the lower right corner of this page when requesting service assistance for specific units.

Branson Sonic Power Company equipment is manufactured under one or more of the following U.S. patents:

3,328,610	3,469,211	3,586,122	3,666,599	3,764,442	3,873,859
3,378,429	3,483,066	3,586,589	3,666,602	3,785,910	3,917,146
3,384,284	3,489,241	3,601,084	3,679,526	3,790,059	3,920,504
3,394,274	3,489,930	3,602,421	3,697,357	3,791,569	3,921,015
3,421,939	3,491,250	3,607,580	3,698,408	3,808,080	3,939,033
3,432,691	3,493,457	3,608,648	3,699,719	3,813,006	3,945,618
3,440,118	3,524,085	3,614,484	3,721,833	3,813,021	3,946,280
3,441,875	3,526,792	3,619,671	3,734,805	3,833,163	3,955,740
3,443,130	3,529,660	3,628,071	3,737,361	3,848,792	4,006,707
3,464,102	3,561,462	3,645,504	3,752,380	3,852,144	4,016,436
3,468,731	3,573,781	3,649,420	3,752,381	3,863,826	4,313,778

D225,110

Processes described in this publication are covered by one or more of the following U.S. patents:

3,224,916	3,401,446	3,499,808	3,595,453	3,966,520	3,382,257
3,440,117	3,526,554	3,765,973	3,969,544	3,331,719	3,440,118
3,563,822	3,893,223	3,972,758	3,367,809	3,468,731	3,577,292
3,899,116	3,981,759				

Printed in U.S.A. 7/85

WARRANTY

When used in accordance with written instructions and under normal operating conditions, Branson Ultrasonics Corporation (BRANSON) equipment is guaranteed to be free from defects in MATERIAL and WORKMANSHIP for one (1) year from the date of original delivery by BRANSON or by an authorized representative. Any unit which proves defective during the stated period will be repaired free of charge or replaced at the sole discretion of Branson Ultrasonics Corporation, F.O.B. Danbury, Connecticut, or an authorized repair station as advised by BRANSON, if the defective unit is returned properly packed with all transportaion charges prepaid. A limited warranty as specified may apply to certain components of the equipment.

WARRANTY EXCEPTIONS

This warranty shall not apply to equipment subjected to misuse, improper installation, alteration, neglect, accident or improper repair. The use of the hand tool for longer than a 50 percent duty cycle (weldpower-on, weldpower-off and wait) or longer than six seconds per weld, is above specified maximum and constitutes misuse of the tool.

This warranty is limited to the original purchaser and is not transferrable.

Horns and tips fabricated by Branson for use in equipment described in this manual are manufactured to exacting parameters and tuned to vibrate at 20,000 Hz. An improperly tuned horn/tip can cause undue stress or damage to the converter and power supply. The warranty may become void if the equipment is used with such horn/tips. Contact your Branson representative or Branson Ultrasonics Corporation, Danbury, Connecticut, if you have any questions concerning horn/tip or tip attachment qualification.

No warranties expressed or implied have been made other than those stated herein. BRANSON HEREBY DISCLAIMS ANY WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Questions relating to warranty or repairs in the continental United States should be addressed to Branson Ultrasonics Corporation, attention: Repair Department, or the nearest Branson Ultrasonics Corporation sales office. In countries outside the United States, please contact the local Branson sales office or authorized representative.

IMPORTANT NOTICE

The success of cutting an article by the user of the BRANSON Ultrasonic Trim Knife depends upon upon many situational factors, including knife amplitude, knife pressure, and the composition and thickness of material to be cut.

BRANSON recommends that articles cut, and especially those intended for critical or life-supporting medical applications, be carefully inspected and tested after cutting to assure their integrity, soundness, and suitability for use in their intended purpose.

W-E150C, 9/86

FOR SAFETY OF OPERATING PERSONNEL, OBSERVE THE FOLLOWING WARNINGS:

WARNING INSTALLATION/SETUP

1. Make sure that the hand tool is properly grounded. Do not operate if it is not.

2. Never use the hand tool's converter without its factory protective cover. A shock hazard could exist if a converter is used alone.

3. No safeguard, safety appliance or device attached to or forming an integral part of the equipment shall be removed or made ineffective except for the purpose of making immediate repairs or adjustments. After repair or adjustment, all safety devices must be replaced before the equipment is operated.

4. If a cutting blade is installed, wear protective glasses during operation and servicing. Never point a cutting attachment at anyone, lest the cuttting-blade fly out and injure someone. It is mandatory to use the blade-changing fixture provided to change blades.

WARNING OPERATION

1 Do not put any part of your body under the tip during operation. Ultrasonic vibrations, with presssure applied, can cause severe and permanent injury.

2. Do not touch the tip when the equipment is operating. Ultrasonic vibrations can burn the skin if pressed against a vibrating horn. A vibrating cutting-blade attachment can seriously injure humans if not used according to instructions.

3. Do not operate equipment with the cover(s) open. High voltage is present within the equipment when connected to plant wiring.

4. When large plastic parts are subjected to ultrasonic processing, they may vibrate at a frequency within the human hearing range at a sufficiently high intensity to warrant the wearing of ear protection by the operator. Use of other noise reduction methods or redesign of the workpiece may also be necessary.

WARNING MAINTENANCE

1. Any safeguard, safety appliance, or device removed or made ineffective during the repair or adjustment of the equipment must be replaced immediately upon the completion of such repair or adjustment.

2. Do not operate equipment until repairs and adjustments have been made and the equipment is in good working condition.

WARNING MATERIALS

When being processed, certain plastic materials may emit toxic fumes and/or gases hazardous to an employee's health. Where such materials are processed, proper ventilation of the work station is required. Inquiry should be made to the U.S. Department of Labor concerning OSHA regulations for a particular plastic prior to processing with ultrasonic equipment. NOTE: Processing of PVC materials can be hazardous to an operator's health.

(Continued)

SECTION 1

INTRODUCTION

1A PURPOSE OF MANUAL

This manual contains setup, operation, and service instructions for the E-150C Power Supply and the Ultrasonic Trim Knife (UKT).

NOTE = Inconvenience only if disregarded-- no damage or personal injury.

CAUTION = Equipment damage may occur, but not personal injury.

WARNING = Personal injury may ocur -- DO NOT DISREGARD.

SECTION 2

DESCRIPTION AND SPECIFICATIONS

2A PURPOSE OF EQUIPMENT

The Ultrasonic Trim Knife operates with an E-150C, 150-watt 20-kHz Ultrasonic Power Supply and a TW series converter, which supplies ultrasonic energy for a variety of light-duty applications including the Handheld UKT hand tool. Branson's Handheld Ultrasonic Trim Knife cuts a variety of aerospace composites and other difficult-to-cut substances.

NOTE

For a cutting job, it is necessary to set the TIMED/CONTINUOUS switch of the E-150C to CONTINUOUS. Details follow. The The E-150C does the jobs of two former models--the welding jobs of the E-150B and the continuous cutting jobs of the C150. The new E-150C, which has a TIMED-CONTINUOUS switch, gives the user a choice of timed sonic energy or continuous sonics energy.

The E-150C's Continuous Sonics mode operates in conjunction with the 7-pin connector only (right rear, under this switch), into which light-duty, finger-trigger Branson hand tools normally plug. (The CONTINUOUS switch position also disables the triggering functions of the other two unused connectors on the rear panel (figure 3-1).)

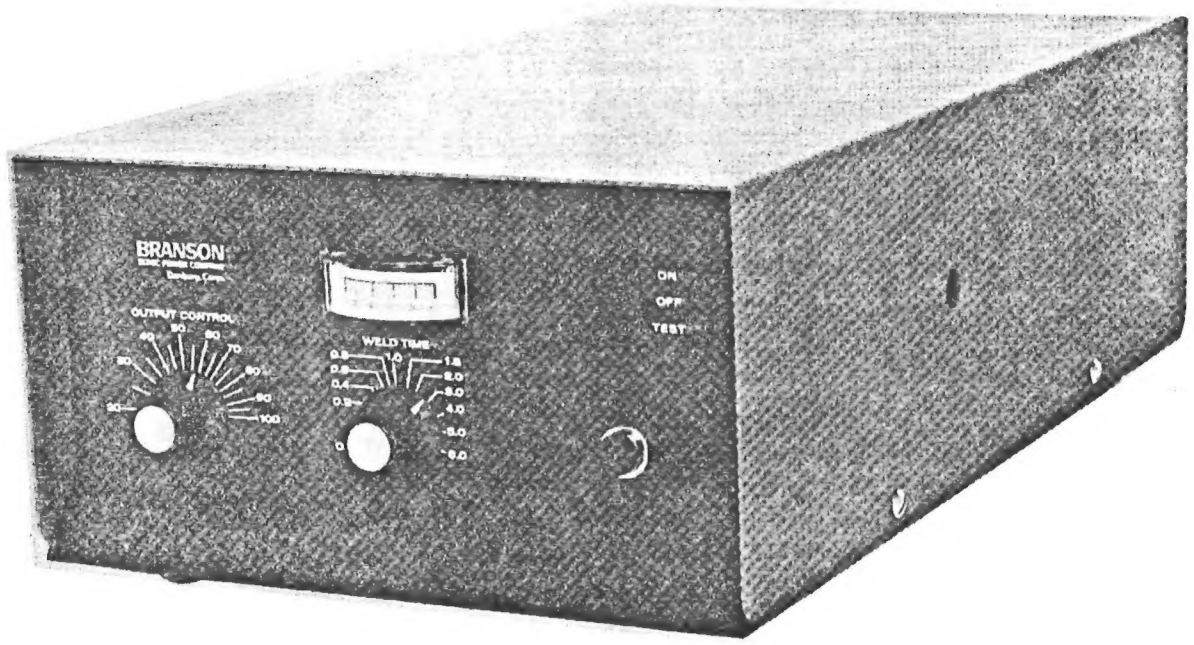

Figure 2-1. Model E-150C Power Supply

2B. Specifications, Model E-150C Power Supply

The following list describes the overall physical characteristics and electrical specifications.

Dimensions

Height	5-1/2 inches (140mm)
Width	9-5/8 inches (245 mm)
Depth	18 inches (460 mm)
Weight	15 lbs. (7 kg)

Electrical Specifications

Power requirements	117V Model	200/245V Model
Line voltage, nominal	110V,	200V, 230V
Line voltage according to tap for locale	100V,* 117V	210V,* 230,* 250V*
Unit fuse	4 A	4A, 4A 4A
Line current drawn	2.2 A	1.4A 1.3A 1.2A
Frequency of output	20 kHz	
Output power	150 electrical watts to converter 135 mechanical watts to load	

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* Export model.

2C. Ultrasonic Trim Knife

See Appendix B.

2D. Principle of Operation

The power supply converts the AC line power to 20 kHz electrical energy. This high-frequency electrical energy drives an ultrasonic converter. The heart of the converter is a lead zirconate titanate electrostrictive element which, when subjected to an alternating voltage, expands and contracts. The converter vibrates in a longitudinal direction and transmits these vibrations through a resonant delivery horn/tip to the work object. In an ultrasonic cutting application, the energy results in a combination of shearing and heating.

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SECTION 3

OPERATOR CONTROLS, INDICATORS, AND CONNECTORS

Each control, indicator, or connector shown in figure 3-1 (below) has an index number for your reference. Table 3-1 (next page)) lists the controls, indicators, and connectors (see item numbers). Table 3-1 briefly describes the function of each item.

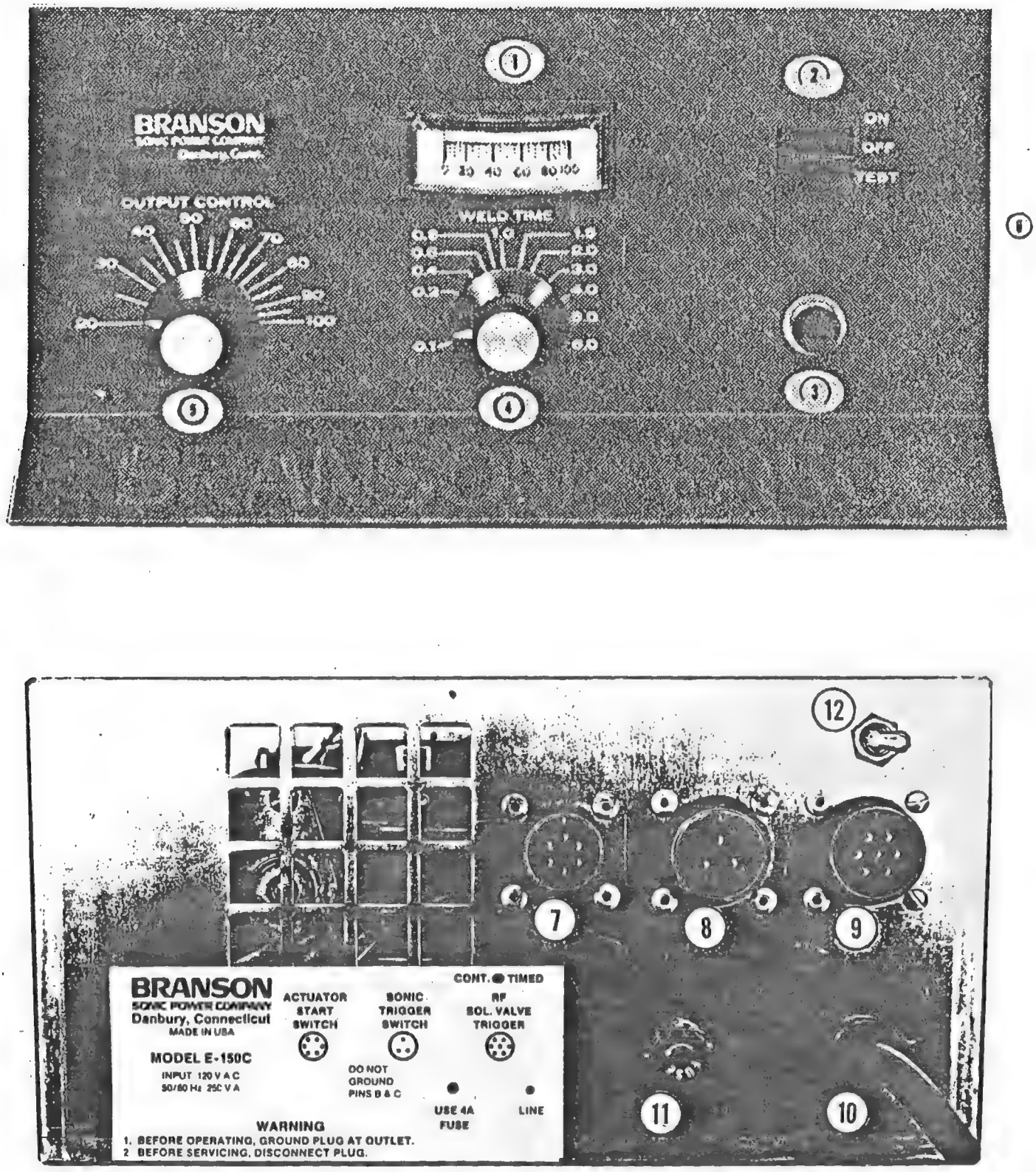

Figure 3-1. Location of Controls, Indicators, and Connectors

Table 3-1. Function of Controls, Indicators, and Connectors

Index No.	Device	Function
1	Loading meter	Indicates level of ultrasonic power transmitted to converter.
2	ON-OFF-TEST switch	ON. Energizes power supply. OFF. De-energizes power supply. TEST. Allows tuning of the power supply.
3	Power On-Off indicator	Indicates when power supply is on.
4	WELD TIME control	Sets the duration of ultrasonics. (0.1 to 6.0 seconds)
5	OUTPUT CONTROL	Controls the amplitude of ultrasonic vibrations. Clockwise rotation increases amplitude.
6	Tuning control	Tunes power supply to converter through an approved extension to the converter. (Screwdriver adjustment, right side of power supply.)
7	6-pin connector	Actuator's start switch and RF out.
8	3-pin connector	Actuator start switch.
9	7-pin connector	Connects power supply to UKT or other handheld portable guns or connects to an remotely triggered converter assembly that does not have a control circuit for an actuator air-cylinder and solenoid. The connector permits remote switching of sonics and supplies RF out.
10	Power Cord	Connects power supply to AC (mains) electrical outlet.
11	4 A fuse	Overload protection.
12	TIMED-CONTINUOUS switch	TIMED. For intermittent, timed welding. CONTINUOUS. E-150C only, this connection permits nonstop cutting, an application where timed sonics is not appropriate. See Note at Sect. 1B.

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SECTION 4

INSTALLATION

4A UNPACKING AND HANDLING

Exercise normal precautions in unpacking and reasonable care in handling to avoid possible damage to the unit. Inspect all external controls, indicators, and surfaces to detect any damage which might have occurred during shipment.

WARNING: When your shipment contains cutting blades as part of an Ultrasonic Trim Knife, read the Warnings and Instructions, Installing or Replacing a Cutting Blade, concerning mandatory use of fixture tool.

NOTE: The shipping company is responsible for damage to equipment during shipment. If damage has occurred, notify shipping company immediately to establish proper basis for claim.

Fill out and return Warranty Card to Branson Ultrasonics Corporation.

4B POWER REQUIREMENTS

The power supply requires a single-phase, three-wire, 50/60 Hz source.

NOTE: 1. To determine voltage requirements, read the voltage on the label at rear of unit, and measure line voltage.

2. If necessary, adjust tap on transformer T4 (export model).

4C PLACEMENT OF POWER SUPPLY

A fan maintains safe operating temperature in the power supply by circulating air over the components. Therefore, the unit must be placed so that the air intake and exhaust are not blocked. If the internal temperature in the power supply rises too high, a thermal cutout switch disconnects the power and keeps it disconnected until the unit cools to a safe temperature. Although the unit automatically re-energizes, it is good practice to determine the reason for the cutout. Periodically examine the air intake and exhaust to ensure that dust or dirt is not restricting the air flow.

SECTION 5

SETUP, ADJUSTMENT, AND OPERATION

The Ultrasonic Trim Knife needs a E-150C or a former C-150 Power Supply. This section tells how to set up and adjust the tuning of a system and how to operate.

5A. SETUP

1. Set up the Power Supply on a table within 5 feet of the objects you want to cut.
2. Plug the Power Supply into a grounded AC mains receptacle.
3. Plug the UKT into the 7-pin connector on the rear of the power supply.
4. Set the TIMED/CONTINUOUS switch to CONTINUOUS.

5B. TUNING THE POWER SUPPLY FOR A CUTTING APPLICATION

Retune the power supply everytime you change a blade or converter. Retune the amplifier on day-one startup. The blade must be in snuggly in place; read the warnings next:

WARNING: Read Warnings and instructions at Appendix B, paragraph Installing or Replacing Blade.

WARNING: Always do the first trial tuning with the output control set to position 20. If you operate the UTK at higher power (higher than 20) while the amplifier is mistuned, the blade may break, fly out, and cause injury to somebody: Always point the gun away from humans and towards the floor when you are tuning.

Tune the power supply as follows:

1. Point the trim knife away from any human, and ensure that the blade holder and the blade are not touching anything.

2. Rotate Output Control to 20.

3. Hold the ON-OFF-TEST switch in the TEST position. Insert a 1/4-inch (6 mm) straight-blade screwdriver through the hole in righthand side cover, and rotate the tuning control for lowest reading on loading meter.

4. Repeat step 3, but set the Output Control to 50.

5. Release ON-OFF-TEST switch.

6. Return Output Control to 20.

5C. OPERATING INSTRUCTIONS FOR A CUTTING APPLICATION

WARNING: High voltage is present in the power supply and the handheld Ultrasonic Trim Knife. Do not operate with cover off. Do not operate with a converter removed from its Branson housing.

WARNING: When ultrasonic energy is applied to the workpiece, the part may oscillate at an audible frequency with enough intensity to warrant ear protection. (See Appendix for listing of manufacturers of hearing protectors.)

WARNING: Do not operate without having followed the instructions and warnings at Setup and Blade Changing Instructions.

CAUTION: Do not substitute generic cutting blades, because Branson's blades are shorter in order to tune properly; moreover, Branson's blades have a special rough surface to speed up the cutting.

1. Ensure that the TIMED-CONTINUOUS switch is set to CONTINUOUS.

2. Set ON-OFF-TEST switch to ON.

3. Set Output Control to 20.

4. Position the cutting blade to the required angle (with respect to the gun's handle) by loosening the converter's big knurled retaining ring and by turning the converter in the housing. Tighten retaining ring to lock the converter in the desired cutting position.

5. To cut or trim something, position the knife where you want to begin a cut, and squeeze the trigger. Ultrasonic energy goes to the blade when you squeeze the trigger. You can adjust the point of actuation for maximum comfort by rotating the recessed hex screw located on the bottom of the handgun behind the handle. Turning the screw clockwise advances the point of triggering to give trigger action earlier in the trigger's stroke.

6. To cut, draw the blade across the material in a normal cutting or scribing motion. Use the curved part of the cutting blade. The pressure required may vary with materials, but the tool should make a cutting job easier.

7. You can adjust the knife's vibratory amplitude with the Output Control. Clockwise increases; counterclockwise decreases. On one hand, a higher amplitude usually speeds up the cutting. On the other hand, the faster you cut the more heat the blade experiences, and the blade brakes easier when very hot. Experience with each material helps determine the best setting. In general, it is good to minimize rather than maximize the Output Control setting.

SECTION 6

MAINTENANCE

6A. GENERAL

Unless the maintenance specialist is knows the equipment's physical makeup and operational characteristics, Branson recommends that he get help from the local Branson field office. In lieu of such local office, contact the Product Support Department at Branson Ultrasonics Corporation, Danbury, Connecticut.

6B. PARTS LOCATION

Figure 6-2 (at end of this section) shows the location of components referenced in this section.

6C. SCHEMATIC DIAGRAM

Schematic diagram, Figure 6-1 (near end of this section), helps maintain and troubleshoot the equipment.

6D. RESISTANCE TABLE

The Table 6-2 helps localize trouble within the power supply. If there is problem, the table usually diagnoses the symptoms and lists which assembly is responsible for the failure. When you use the table, examine the meter for proper range and proper polarity. Then observe as follows:

1. Make all measurements made with a Simpson VOM Model 260. Resistance measurements from another meter may not correspond to those specified.

2. When you examine for infinite resistance readings, allow time for meter to charge up.

3. All readings are subject to $\pm$ 20 percent tolerance.

4. Remove all plugs from the board before taking readings.

Table 6-1. System Trouble Analysis Chart

Look for simple solutions before getting in deeply:

1. **Testing the power supply alone.** With no cables attached to the power supply, a reading of approximately 30 on the loading meter indicates that the supply is operating satisfactorily. If higher, read troubleshooting Chart A for failed transistor and Chart B for failed diode bridge rectifier.

2. **Testing a converter:** Connect the converter to the power supply. Set the Output Control to maximum, set the ON-OFF-TEST switch to TEST: If the unit is properly tuned, the meter indicating approximately 10, tells you that the converter is operating satisfactorily.

3. **Testing a cable for RF continuity.** Use an ohmmeter. There should be continuity from the BNC's center to pin D of the MS connector. BNC ground must conduct to pin E of the MS connector. Examine for possible short, E to D.

SYMPTOM	PROBABLE CAUSE OF ABNORMAL INDICATION
Main power fuse or circuit breaker fails when power supply is plugged in. Switch is in the OFF position.	1. Line cord is shorted. 2. Line filter has failed.
Main power fuse or circuit breaker fails during operating cycle.	1. Underrated fuse or circuit breaker.
Power On-Off indicator fails to illuminate when you flip the ON-OFF switch	1. Light has failed. 2. Unplugged power supply 3. Line cord has failed. 4. Line filter has failed 5. Switch S1 has failed. 6. Fuse F1 has failed. 7. Transformer T3 has failed. 8. Transformer T4 has failed. 9. Accessory equipment has failed.

Table 6-2. System Trouble Analysis Chart

Symptom	Probable Cause of Problem
Fuse F1 fails	1. Underrated fuse F1. 2. Incorrect voltage. 3. Transformer T3 or T4 have failed 4. Diode bridge rectifier D1 has failed (see chart A). 5. Capacitor C1 has failed. 6. Power supply has failed. 7. Transistor has failed. 8. Accessory equipment has failed. 9. Fan has failed. 10. Fan motor B1 has failed.
Power ON/OFF indicator illuminates but fan does not operate.	1. Fan motor B1 has failed.
Ultrasonic power is delivered to the horn. No indication on meter.	1. Meter M1 has failed.
No or inconsistent ultrasonic power. Power supply tuning is difficult you try to draw sonic power.	1. Thermo switch is activated. 2. Power supply is improperly tuned. 3. Trigger switch or accessory equipment is faulty. 4. Power control is improperly adjusted. 5. Converter has failed. 6. RF cable has failed. 7. Transistor has failed (see chart A). 8. Power supply has failed. 9. Tuning assembly has failed. 10. Relay CR2 has failed.
Power supply operates when switch is in TEST position but does not operate when switch is in ON position.	1. Cable to trigger has failed. 2. ON/OFF/TEST switch has failed. 3. Trigger switch is improperly adjusted or has failed. 4. Relay CR4 has failed.
Converter is warm.	1. Power supply operates at more than 50 percent duty cycle. 2. Converter tip is loose (must be torqued to 90 inch-lb. (10 $\pm$ 0.6 newton-meters).
A slight electrical shock is felt when touching the unit.	1. Power supply is improperly grounded. 2. Line cord has failed.

TABLE 6-3 RESISTANCE CHART A, HEATSINK ASSEMBLY

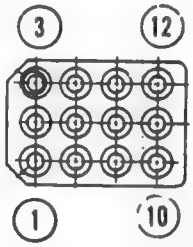
OHMMETER POLARITY		RESISTANCE IN OHMS	REMEDIAL ACTION IF MEASUREMENT DOES NOT AGREE
+	-	Rx 1 Scale	
1	2	infinite	Replace Q1 and Q2
2	1	infinite	
12	2	8 - 10 Ohms	
2	12	infinite	
12	1	8 - 10 Ohms	
1	12	infinite	
1	3	infinite	Replace Q1 and Q2
3	1	infinite	
10	1	8 - 10 Ohms	
1	10	infinite	
10	3	8 - 10 Ohms	
3	10	infinite	
6	9	zero Ohm	Replace Thermo Switch 

TABLE 6-4 RESISTANCE CHART B, DIODE BRIDGE RECTIFIER

OHMMETER POLARITY +	OHMMETER POLARITY -	RESISTANCE SCALE	RESISTANCE IN OHMS	REMEDIAL ACTION IF MEASUREMENTS DO NOT AGREE
1	3	RX100	7.5 K Ohms	If resistance is low check Heatsink, Chart A, and check capacitor across bridge.
2	1	RX1	8 - 10 Ohms	Replace Bridge Rectifier D1
1	2	RX1	infinite	
4	1	RX1	8 - 10 Ohms	
1	4	RX1	infinite	
3	2	RX1	8 - 10 Ohms	
2	3	RX1	infinite	
3	4	RX1	8 - 10 Ohms	
4	3	RX1	infinite	

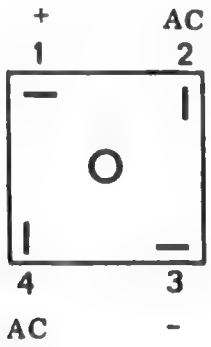
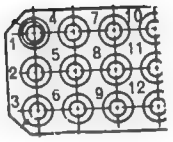


TABLE 6-5 RESISTANCE CHART C,

CONNECTOR J2

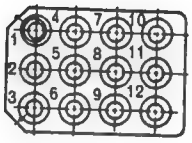


	+7	+9	+10	+12	+13	+15	
-7	0	47k	12k	68k		12k	
-9	33k	0	40k	100k		40k	
-10			0				
-12	175k	120k	200k	0		185k	
-13	15k	47k	22k	84k	0	22k	
-15	300k	330k	330k	370k		0	

Blank squares indicate infinite resistance.

TABLE 6-6 RESISTANCE CHART D,

CONNECTOR J3



	+2	+3	+4	+6	+7	+10	+12
-2	0		5-13		5-13	5-13	
-3		0					5-13
-4			0	22k	0		
-6				0			
-7			0	22k	0		
-10				22k		0	
-12		330					0

Blank squares indicate infinite resistance.

TABLE 6-7 RESISTANCE CHART E,

CONNECTOR J5

	+1	+2	+3				
-1	0	72k	38k				
-2		0	22k				
-3		135k	0				

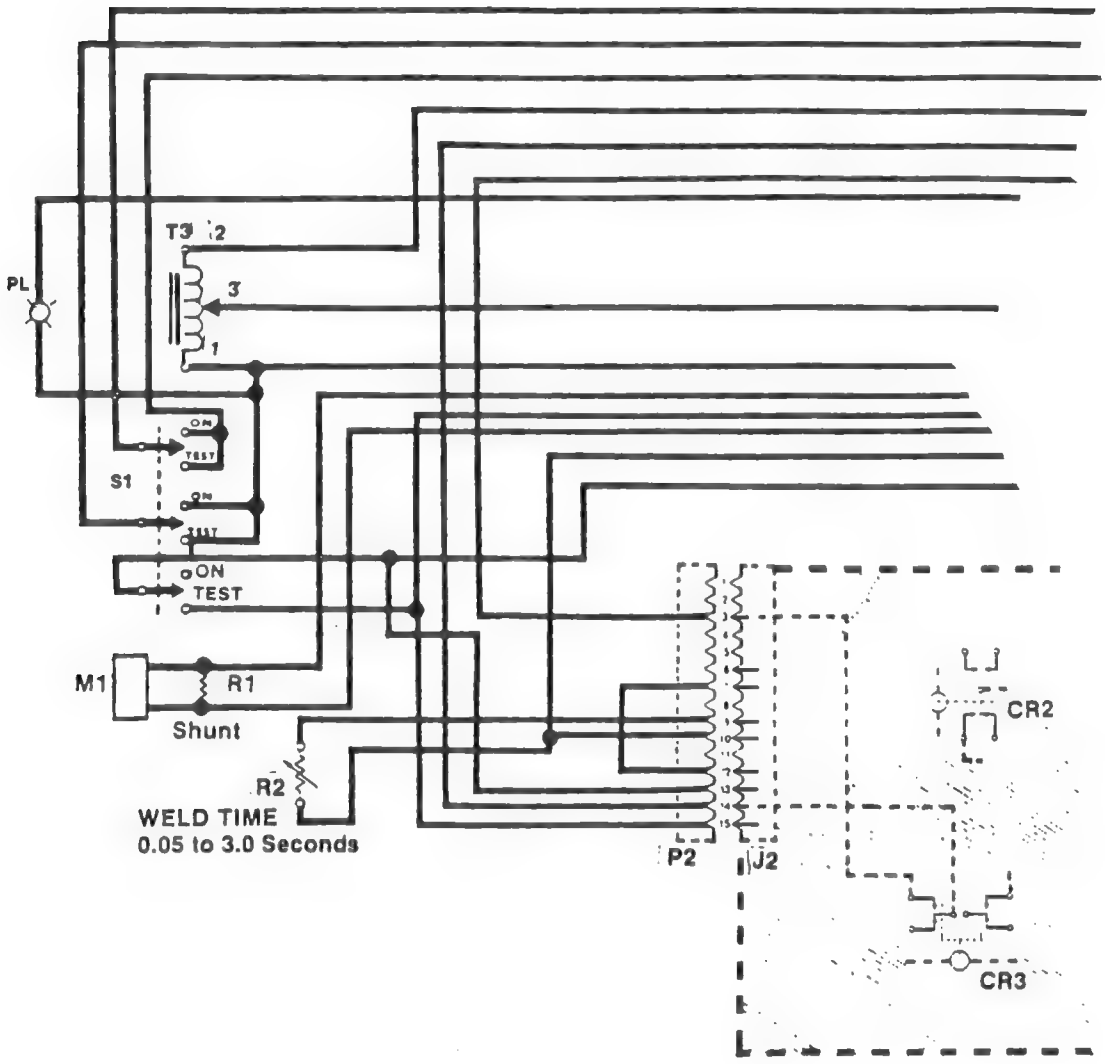
Blank squares indicate infinite resistance.

TABLE 6-8 RESISTANCE CHART F,

CONNECTOR J6

	+1	+2	+3				
-1	0	72k	38k				
-2		0	22k				
-3		135k	0				

Blank squares indicate infinite resistance.



* Switch S2 and the two conductors to its CONTINUOUS poles, permit the user to configure the unit for Continuous Sonics mode of operation. This revision is present beginning on E150C units but not E150B or earlier.

Figure 6-1L Schematic Diagram (continued)

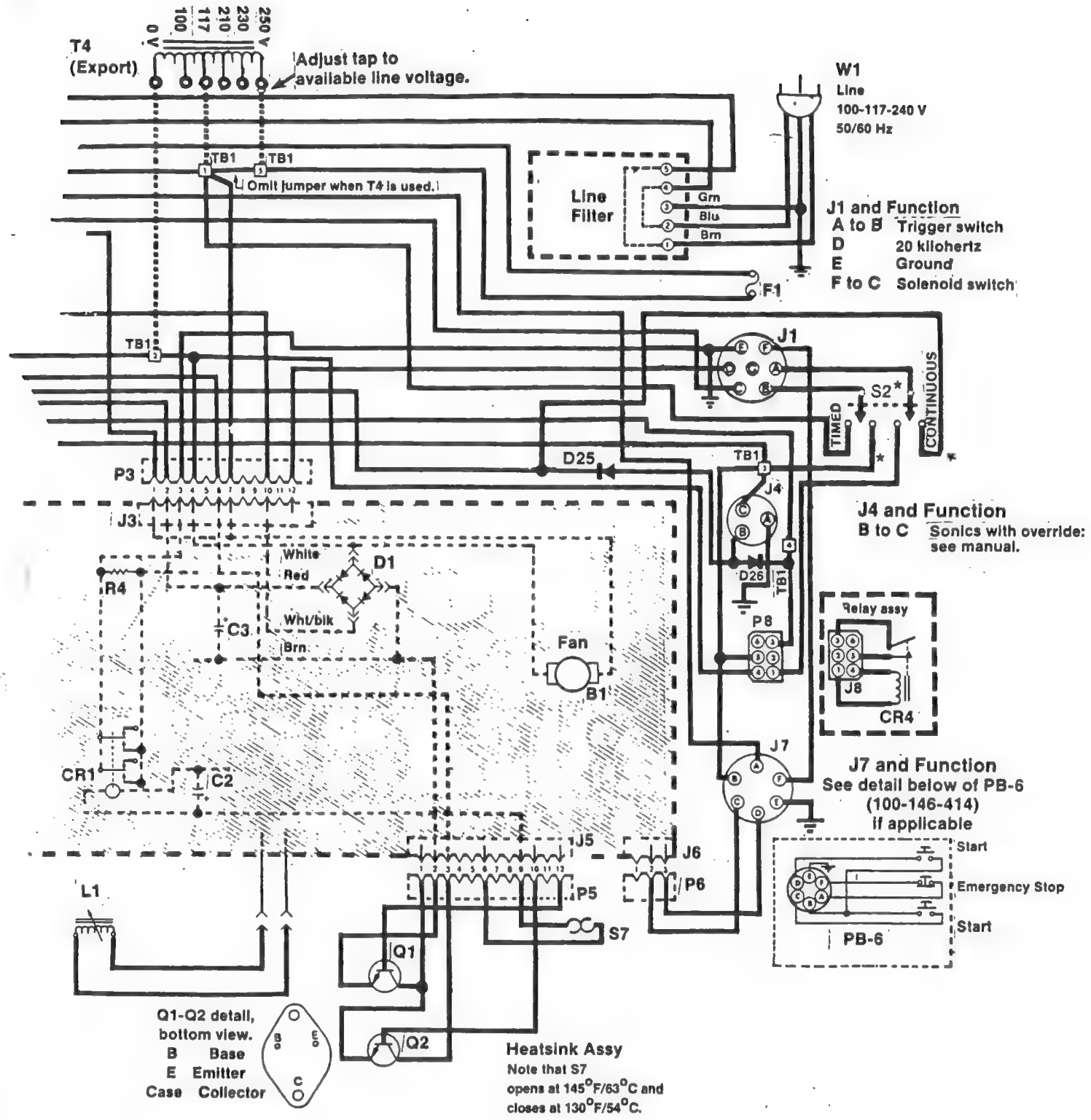


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Figure 6-1R Schematic Diagram

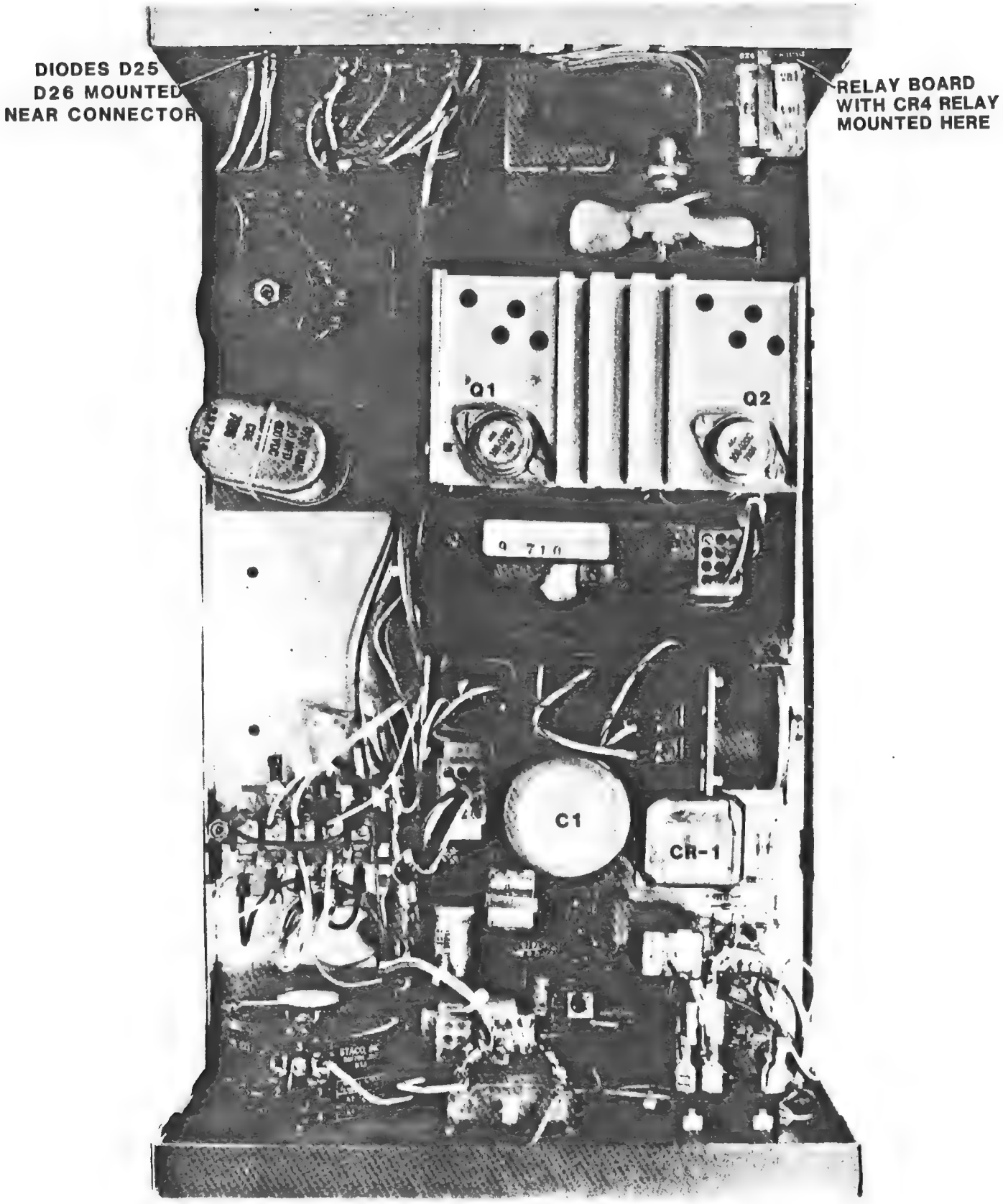


Figure 6-2 Parts Location Illustration

E-150C Power Supply
Electrical Parts List

Reference Designation	Description	Branson EDP No.
B1	Fan motor	100-069-001
Fan Blade	(Not supplied with B1) 3-1/2 in. dia.	200-005-012
C9	Capacitor 5 mf, 450V	200-016-170
C1	Capacitor 550 mf, 200V	200-016-104
CR2	Relay P&B KUP 11A15	200-084-005
CR1	Relay R10-E1-Y2-J2.5K	200-084-031
CR4	Relay	200-084-049
D1	Diode, bridge	200-035-024
F1	Fuse, 4 ampere	200-049-009
Fuse Holder		200-050-001
J1	Connector, MS 3102A-16S-1S	200-029-087
J2	Plug, Molex 15 pin No. 1375P	200-080-010
J3, J5	Plug, Molex 12 pin No. 1360P	200-029-081
Pins for J2, J3, J6, J7, J8.	Pins, Molex 1376	200-103-061
J4	Connector Ms 3102-16S-5S	200-029-018
J7	MS 3102A-14S-6S	200-029-085
L1	Tuning Assembly	100-146-246
M1	Meter	100-068-006
P/L	Pilot Light	200-011-007
P2	Receptacle, Molex 1375R	200-082-003
P3, P5	Receptacle, Molex 1360R	200-082-004
P8	Plug, Molex, 6-pin	200-082-006
Pins for P2, P3, P4, P5, P8	Pins, Molex No. 1381	200-103-031
Q1, Q2	Transistor 108-020	100-108-020
R1	Resistor, meter shunt	100-173-013
R2	Potentiometer	100-086-014
S1	Switch ON-OFF-TEST	200-099-049
S2	Switch, CONTIN/TIMED dpdt toggle*	200-099-006
S7	Thermoswitch A762	200-099-031
T3	Variac Assembly	100-146-553
T4	Transformer 100V/250V (export)	100-107-033
W1	Line cord, domestic	200-030-003
Line Filter	FCC/VDE universal line filter	100-146-724
E-150C module	Complete internal module	100-146-534
1/4-oz. tube	Silicone grease	101-053-002
D25, D26	Diode, 1N4006	200-035-042

* Present in E-150C units, not in E-150B units and earlier.

6D HOW TO OBTAIN FURTHER ASSISTANCE

6D,1 Calling Your Authorized Branson Representative

If you continue to have a problem despite the information contained earlier in this section, call the authorized Branson field sales or representative. This representative knows you, your needs, and your applications. He may have a critical part in stock that quickly restores your machine to operation.

Before you call, have the following information ready:

a. Have this manual with you.

b. Know the model number and the serial number of your power supply and each major accessory.

c. Know how the system has been set up and equipped:

   a. Type of material you are working with,
   b. Accessories.

d. Describe the problem.

e. List the steps you have already taken.

f. Keep a list of service spares on hand.

Enter the name and phone number of your Branson Representative here:

Name_____

Phone_____ _____
Area code Number

6D,2 Calling Branson, Danbury

If the local Branson representative is unavailable, call Branson in Danbury.

Problem solving in Danbury is divided into three areas:

Applications: Ask for the Plastics Processing Lab.

Standard Equipment: Ask for Product Support.

Before you call, have the following information ready:

a. Have this manual and the power supply manual with you.
b. Know the model number and the serial number of your power supply and each major accessory.

c. Know how the system has been set up and equipped:

(1) Type of material you are working with
(2) Accessories

The phone number of Branson, Danbury is (203) 796-0400.

6D,3 Returning Equipment

The Authorization to Return Equipment form, at the end of this book, should accompany any equipment returned to Branson Ultrasonics Corporation by customers. Use of this form will ensure proper handling and identification of your equipment and expedites its repair and/or return.

Complete the form according to the instructions on the reverse side. They are repeated here for your convenience.

1. **Inventory of Returned Equipment:** List each item on a separate line (if necessary use more than one form).

2. **Reason for Return:** Use one of the following code numbers to indicate the reason you are returning the item(s):

   - Repair
   - Termination of rental
   - Termination of consignment
   - Returned for modification
   - Returned for analysis
   - Other: describe under Section 5
   - Credit

3. **Under Warranty?:** To the best of your knowledge, is this item still covered under Branson's Warranty?

4. **Repair Authorization:** If your puchase order states a dollar limit per item or a percent of the cost of a new item as the authorized repair limit, repairs may proceed immediately.

5. **Instructions/Comments:** Please use this space to describe any symptoms or equipment malfunction, or other special instructions.

6. **Shipping and Billing Instructions:** Please indicate fully and clearly the billing and shipping address(es).

In addition:

7. For equipment not covered by the warranty, include a purchase order to avoid delay.

8. Pack carefully to avoid possible damage in shipment.

9. Return general repairs by any convenient method. Send priority repairs by air freight.

10. Prepay the transportation charges FOB the repair site (either the field office or Danbury, Connecticut).

APPENDIX A

Manufacturers of Hearing Protectors

AMERICAN OPTICAL COMPANY
Department 4634 F
Southbridge, Massachusetts 01550

BAUSCH AND LOMB
90302 Lomb Park
Rochester, New York 14602

BILSOM INERNATIONAL, INC.
11800 Sunrise Valley Drive
Reston, Virginia 22091

EAR CORPORATION
376 University Avenue
Westwood, Massachusetts 02090

FLENTS® PRODUCTS CO., INC.
14 Orchard Street
Norwalk, Connecticut 06850

GLENDALE OPTICAL COMPANY, INC.
130 Crossways Park Drive
Woodbury, L.I., NY 11797

SELLSTROM MANUFACTURING COMPANY
Sellstrom Industrial Park
Box 355
Palatine, Illinois 60067

Manufacturers of Sound Absorbing Material

ANTIPHON, INC.
144 Benton Street
Stratford, Connecticut 06497

D.C. BELL COMPANY
1590 N. Kingsbury Street
Chicago, Illinois 60022

FERRO CORPORATION
Composites Division
34 Smith Street
Norwalk, Connecticut 06856

GLOBE INDUSTRIES
2638 East 126th Street
Chicago, Illinois 60633

KORFUND DYNAMICS
21 Cantiague Road
Westbury, New York 11590

NOISEDAMP CORPORATION
Eastern Operation
700 Pleasant Street
Watertown, Massachusetts 02172

NOISEDAMP CORPORATION
Midwestern Operation
1825 Webster Street
Dayton, Ohio 45404

NOISEDAMP CORPORATION
Western Operation
2323 Valley Street
Burbank, California 91505

SCOTT - Foam Division
1500 E. Second Street
Chester, Pennsylvania 19013

SPECIALTY COMPOSITES CORPORATION
Delaware Industrial Park
Newark, Delaware 19711

THE SOUNDCOAT COMPANY, INC.
175 Pearl Street
Brooklyn, New York 11201

NOTE: The information given above is supplied with the understanding that no product discrimination is intended and that no endorsement of a product by Branson is implied.

APPENDIX B ULTRASONIC TRIM KNIFE (UKT)

The Ultrasonic Trim Knife operates with an E-150C, 150-watt 20-kHz Ultrasonic Power Supply and a TW series converter. The UKT has a finger-operated trigger to remotely start the ultrasonic power in the power supply. Branson's Handheld UTK cuts a variety of aerospace composites and other difficult-to-cut substances.

B-1. Dimentions of the UKT

Length:	7.25 inches (185mm)
Maximum diameter:	2 inches (50mm)
Height	6.25 inches (160mm)
Weight:	2.5 pounds (1.3 kg)

B-2. Disassembly of UTK

1. Unscrew and remove the converter retaining ring (2) with grounding washer (3) from UTK body (1) (Figure B-1).
2. Pull converter (4) TW1 or TW2 from body.
3. To gain access to trigger switch and cable connectors.
    a. Remove the trigger-switch activating screw from the underside of handle (recessed).
    b. Remove set screw on the top back end of the body.
    c. Remove 4 roundhead screws, two each side that secure handle to body.
    d. Remove switch and cable termination assembly by pulling from back end of housing.

B-3. Assembly of UTK

Reassemble by reversing procedure of disassembly. Adjust trigger switch activation screw for comfortable operation of switch.

WARNING

High voltage is present within the converter. Ensure that the grounding washer is always properly installed.

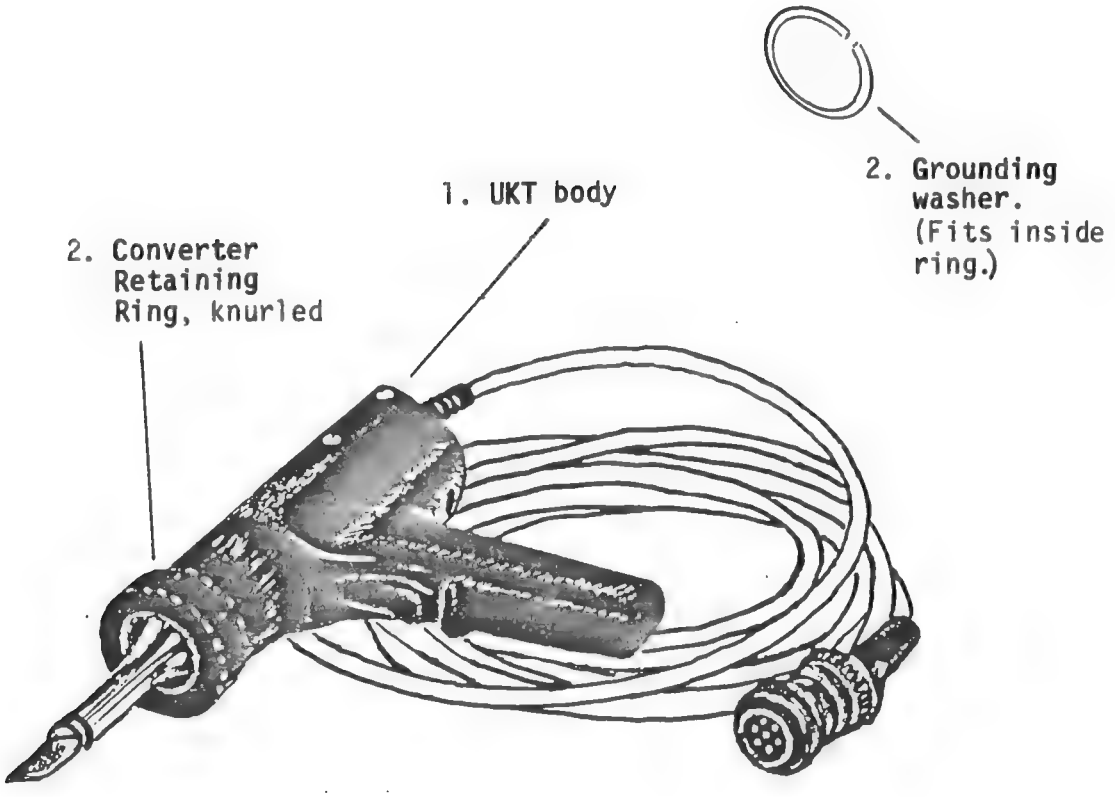


Figure B-1 Ultrasonic Trim Knife

B-4. INSTALLING OR REPLACING BLADE

Follow the instructions, Warnings, and Caution as follows:

WARNING

1. **The blade for the Ultrasonic Trim Knife is extremely sharp. Use extreme care in handling this tool. Use eye protection while tool is in use.**

2. **Always use the blade-changing fixture (199-085-057) and a single wrench to change or install a blade in the Ultrasonic Trim Knife's blade-holding collet. Do not attempt to change blades by using two hand wrenches, because there is considerable danger of bodily injury if the tool slips.**

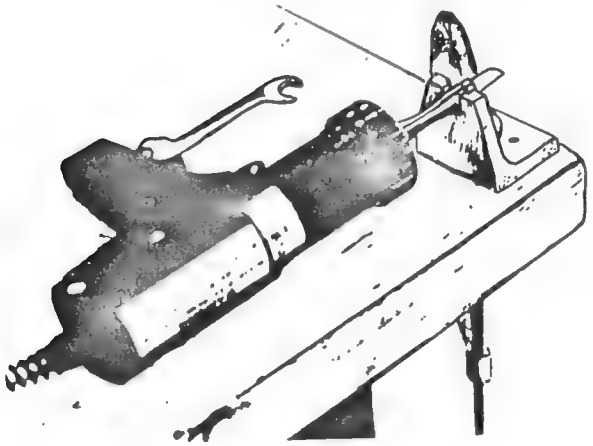


Figure B-2.1

a. Clamp or bolt the blade-changing fixture (see figure B-2.1) to a table close to the power supply.

b. Loosen the converter's retaining ring on the handgun.

c. Slide the flats at end of horn into the fixture and turn the handgun's handle until it lies flatly on the bench.

CAUTION:
Do not put grease on any threads where ultrasonic energy exists.

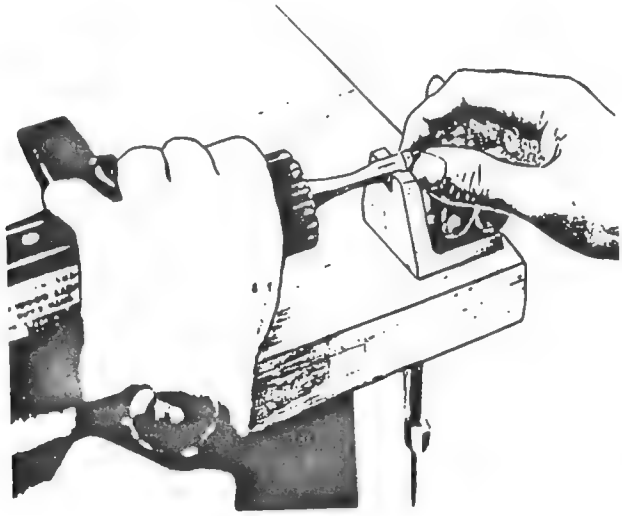


Figure B-2.2

d. Screw blade holder into end of the converter (See figure B-2.2.)

e. Grip sides of the blade carefully and seat the blade in the slot of blade holder. (figure B-2.2) Fully engage blade so bottom of blade is touching and square with bottom of slot.

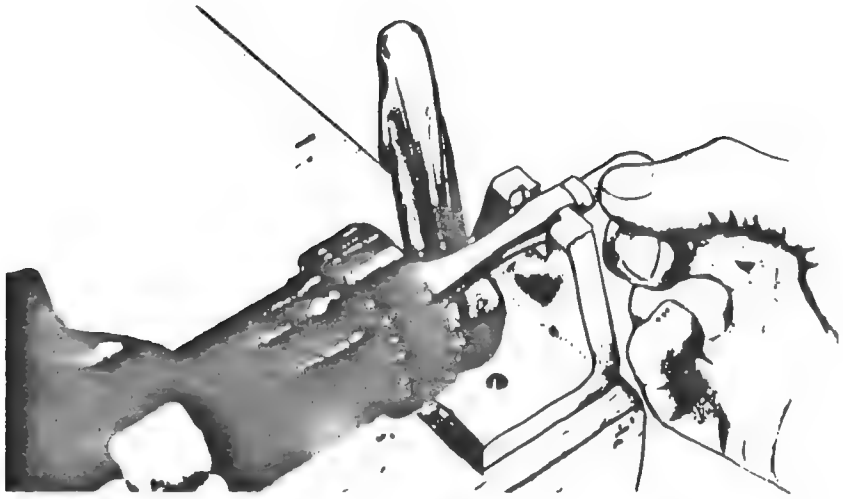
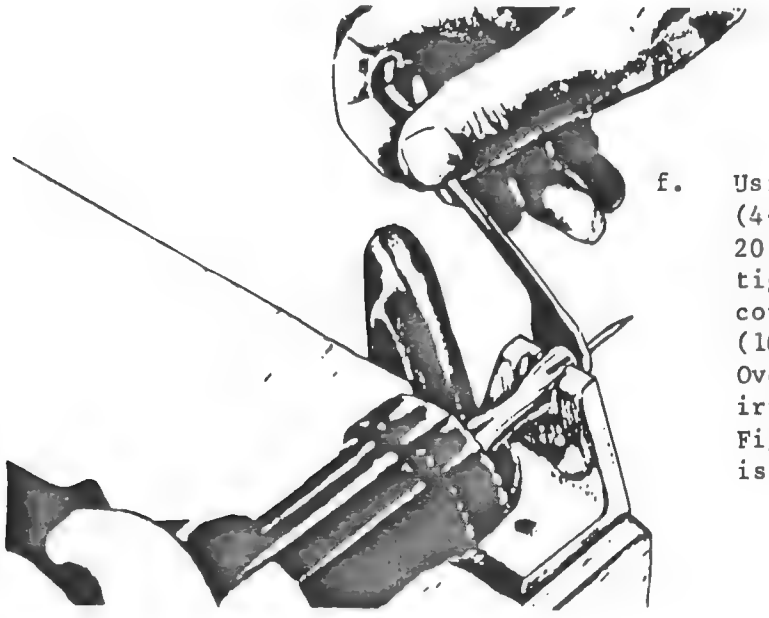


Figure B-2.3



f. Using a 7/16-inch wrench (4-1/2 inches long 201-118-010) provided, tighten blade holder in converter to 90±5 inch-lb (10±0.6 N-M). CAUTION: Overtorquing causes irreversible damage. (See Figure B-2.4.) [4-1/2 inches is approximately 12 cm.]

Figure B-2.4

g. Remove Ultrasonic Trim Knife from fixture and position the blade to required angle (with respect to the cutting job) by rotating the converter within its housing. Tighten the big knurled retaining ring (figure B-2.4 and B-1) to lock the converter in position.

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B-5. Parts List, Handheld Ultrasonic Trim Knife

Reference Designation	Branson Description	EDP No.
1.	Hand Piece Assembly (with trigger)	149-085-041
2.	Housing	109-085-026
3.	Block, guide	109-085-025
4.	Retainer	109-085-027
5.	Cable assembly	149-085-042
6.	Screw, flathd, 6-32 x 3/8 inch	200-098-065
7.	Switch, subminaturei	200-099-097
8.	Block, switch mounting	100-006-091
9.	Insulator	100-062-040
10.	Screw binding head, 2-56 x 5/8 inch	200-098-003
11.	Block, insulating	100-006-090
12.	Assembly, BNC Conn/Cable	100-146-783
13.	Ring, retaining 5/16 inch	200-087-011
14.	Label, Warning	109-085-034
15.	Grounding washer	109-085-058
16.	Label, model.	100-065-127
17.	Screw Set, 6-32 x 3/8 inch	200-098-215
18.	Grip cord, strain relief	109-085-084
*	Blade-changing fixture	199-085-057

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* Shown clamped to the bench in figure B-2.1.

B-5 Layout Drawing of UKT

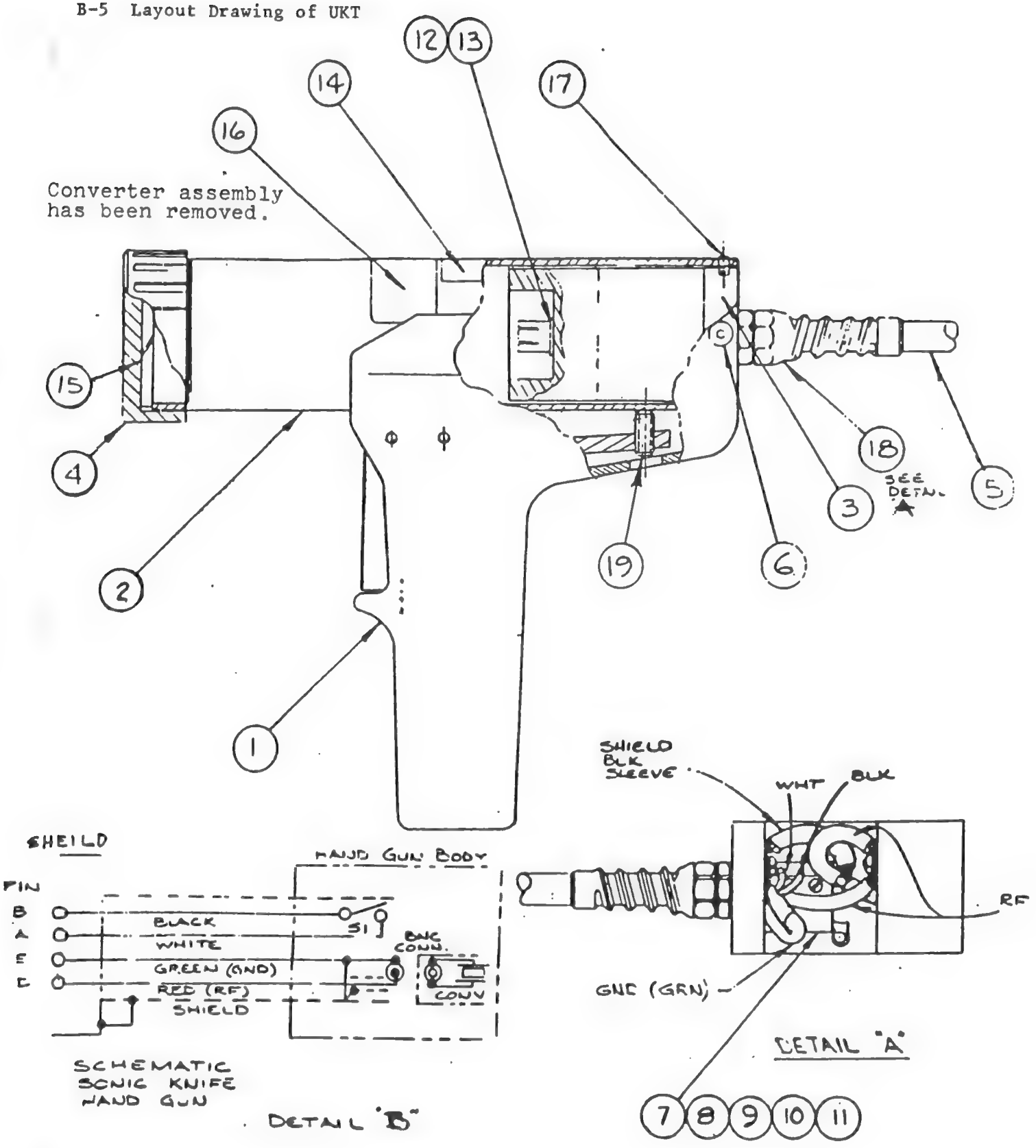

Figure B-3 Layout Drawing of Ultrasonic Trim Knife

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APPENDIX C CONVERTERS FOR POWER SUPPLY E-150C

The converters, TW-1, TW-2, and TW-3, (part numbers listed below) listed here have built-in boosters, and the model numbers offer various gains. The tip that holds the blade attaches to the end of the booster. (These converters also fit into a Branson **welding** handgun; and welding horn tips can attach on these converters where the cutting-blade-holding tip fits.)

In a cutting application, higher amplitude can result in quicker cutting, but the increase can result in heat at the blade-material interface. Operating the blade at higher temperature makes the blade more subject to accidental breakage. Experience shows the user what compromise is efficient.

The TW-1 is a low gain converter used primarily for ultrasonic staking, small spotwelding, and for most cutting.

The TW-1 has a peak-to-peak amplitude is 75 microns. The TW-1 has more force but less amplitude than the TW-2.

The TW-2 is a high gain converter used for welding, staking, swaging of thermoplastics, and cutting.

The TW-2 has a peak-to-peak amplitude is 125 microns, and both welding and cutting jobs employ this converter, depending on whether the cutting or welding job needs this amplitude.

The TW-3 is a very low gain converter used primarily for applications that require a very small amplitude.

The TW-3 has a peak-to-peak amplitude is 35 microns, but it more force than the TW-1. This converter is not in typical use for cutting.

Converter	Part Number
TW-1	101-135-015
TW-2	101-135-016
TW-3	101-135-031

CAUTION

Converter reliability can be adversely affected if the converter is subjected to temperatures above 140°F (60°C).

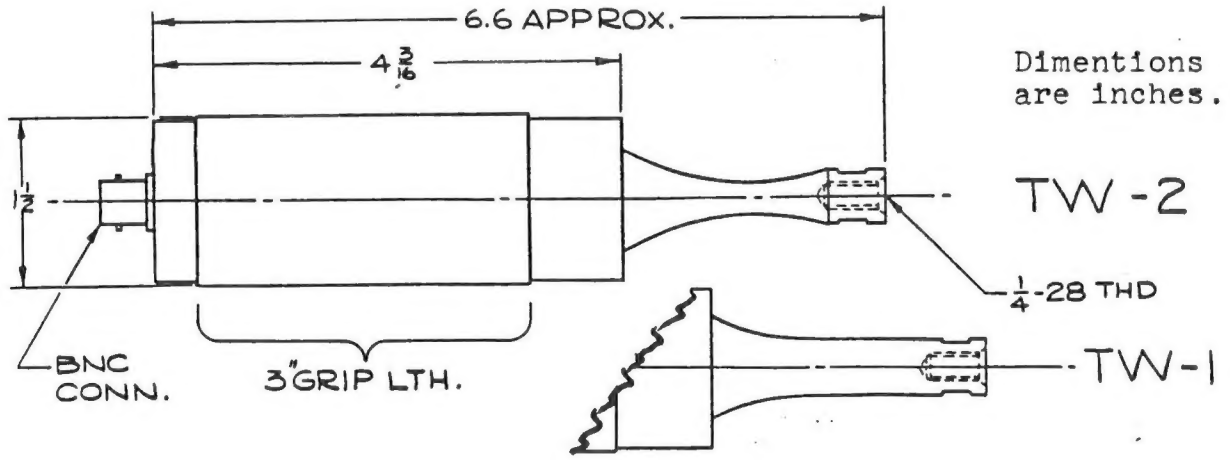

Figure C-1 TW-type Converter's Outline Drawing

AUTHORIZATION TO RETURN EQUIPMENT

This document provides the authority to return the equipment listed below. Please fill out this form completely, using the instructions printed on the reverse side. This will expedite the repair and/or return of equipment.

TO: **BRANSON ULTRASONICS CORPORATION**
EAGLE ROAD
DANBURY, CONNECTICUT 06810-1961

FROM: _____

_____

ATTENTION _____ _____

DATE	CUSTOMER'S REFERENCE NUMBER	PERSON TO CONTACT	TELEPHONE NUMBER

① INVENTORY OF RETURNED EQUIPMENT

ITEM	DESCRIPTION	MODEL NUMBER	EDP NUMBER	SERIAL NUMBER	② REASON FOR RETURN	③ UNDER WARRANTY YES	③ UNDER WARRANTY NO	④ REPAIR COSTS ARE AUTHORIZED NOT TO EXCEED: (DOLLAR AMOUNT OR % OF NEW ITEM).
1								$ OR %
2								$ OR %
3								$ OR %
4								$ OR %
5								$ OR %
6								$ OR %
7								$ OR %
8								$ OR %
9								$ OR %
10								$ OR %

REPAIR AUTHORIZATION: BRANSON ULTRASONICS CORPORATION IS AUTHORIZED TO REPAIR EQUIPMENT LISTED ABOVE BUT NOT TO EXCEED A TOTAL OF ▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪➡

OUR PURCHASE ORDER NO. _____ CUSTOMER'S AUTHORIZED SIGNATURE _____ DATE _____

⑤ INSTRUCTIONS/COMMENTS _____

_____

_____

⑥ UPON COMPLETION OF REPAIRS BRANSON IS DIRECTED TO:

SHIP EQUIPMENT TO:	BILL TO

SPECIFIC SHIPPING INSTRUCTIONS

FOR BRANSON ULTRASONICS CORPORATION'S USE ONLY

RECEIVED AT B.U.C. BY	DATE	COLLECT CHARGES $	SHIPPING DAMAGE ☐ YES NO ☐	SENT TO:

B.U.C. NO.	TERR. NO.	VALUE	DATE SCHEDULED	

INSTRUCTIONS

This Authorization to Return Equipment form must accompany any equipment returned to Branson Ultrasonics Corporation by customers and field offices. Proper use of this document ensures minimum handling and greatly expedites the repair and/or return of equipment.

(1) **Inventory of Returned Equipment:** List each item on a separate line (if necessary use more than one form).

(2) **Reason for Return:** Use one of the following code numbers to indicate the reason you are returning the item(s):
1. Repair
2. Termination of rental
3. Termination of consignment
4. Returned for modification
5. Returned for analysis
6. Other - describe under section 5
7. Credit

(3) **Under Warranty?:** To the best of your knowledge, is this item still covered under Branson's Warranty?

(4) **Repair Authorization:** By your purchase order authorizing a dollar limit per item or a percent of the cost of a new item as authorized repair limits, repairs may proceed immediately.

(5) **Instructions/Comments:** Please use this space to describe any symptoms of equipment malfunction, or other special instructions.

(6) **Shipping and Billing Instructions:** Please indicate fully and clearly the billing and shipping address(es).